

Remarks

Claims 1-20 are currently pending. The Examiner is thanked for granting an interview with the Applicants' representative. The Examiner is further thanked for indicating that the claims of the present application appear to overcome the prior art of record.

Claims 8-14 have been withdrawn. Claims 1, 15, and 16 have been amended solely to clarify the claimed features. As a result, no new subject matter has been added. In view of the foregoing claim amendments and following remarks, reconsideration and withdrawal of all grounds of rejection are respectfully requested.

Claims Rejected under 35 USC §112

The Applicants acknowledge the rejection of Claims 1-7 and 15-20 under 35 USC §112 as being indefinite. In view of the foregoing claim amendments, the Applicants respectfully submit that this ground of rejection is now moot. Specifically, the Applicants have amended independent Claims 1 and 15 to better clarify how a spray angle of 0° can coexist with a junction point in the range of 5-30 cm.

As a starting point, it is important to clarify that the angle range of 0°-80° recited in the claims refers to the angle created in the stream of wash liquid (or "spray angle") as it exits an orifice, and not to the angle of the orifice (or orifice opening) or spray with respect to the nozzle body's central axis. As explained in the Application, the spray angle of fluid as it exits an orifice opening is characterized by the width of the spray stream as it exits the orifice opening. This width is what ultimately determines spray coverage of the liquid at a particular distance from the orifice opening (see pg. 11, lines 12-13 and Fig 3, item 34 of the Specification). For example, a small spray angle is indicative of a narrow spray stream, while a large spray angle is indicative of

a wide spray stream. As can be appreciated by those in the art, the small spray angle will yield smaller spray coverage at a distance D than the wider spray angle at that same distance D.

Thus, to address the rejection directly, there is no direct relationship between a spray angle and the junction point. That is to say, the spray angle (which may be characterized as the width of spray stream exiting the orifice) is totally independent from the junction point at which multiple spray streams intersect. As a result, a spray angle of 0° may readily coexist with a junction point in the range of 5-30cm.

Claims Rejected under 35 USC §103

The Applicants acknowledge the rejection of Claims 1-7 and 15-20 under 35 USC §103 as being unpatentable over US Patent No. 5,178,326 to Kukesh et al. (“Kukesh”), and over US Patent No. 3,835,810 to Hughes (“Hughes”). For reasons set forth below, the Applicants respectfully traverse the rejections, and respectfully request reconsideration and withdrawal of these grounds of rejection.

Claim 1 is directed to a nozzle configured for effectively atomizing wash liquid while creating a sufficient impinging force in the atomized wash liquid to effectively wash gas turbine units. To that end, the claimed nozzle comprises a nozzle body that itself includes (among other features) an intake for receiving wash liquid, and an outlet from which wash liquid exits. Connected to the outlet are number of orifices, each of which includes an orifice opening for dispensing wash liquid at a desired spray angle. Each of the orifices is itself angled toward a central axis of the nozzle body such that liquid emanating from the orifice openings intersect at a junction point along the central axis. Notably, all of the orifices function to dispense wash fluid, and all are located about the central axis.

Kukesh, in sharp contrast, is directed to an industrial resin sprayer that utilizes compressed air streams to prevent particles from accumulating on the sprayer's resin nozzle. (see Abstract and col. 21, lines 11-19). According to Kukesh, the sprayer includes a nozzle assembly (340) that includes a central liquid nozzle (330), positioned in a central opening (344) along the nozzle assembly's (340) longitudinal central axis. In addition, the Kukesh nozzle assembly (340) includes a plurality of air nozzles (342a, 342b) positioned about the central liquid nozzle (330). (see col. 20, lines 49-61; col. 21, lines 6-8). Passageways (397a, 398a) within the nozzle assembly (340) are used to direct compressed air to the air nozzles (342a, 342b) for use in directing particles away from the central liquid nozzle (330). (Id., see also Fig. 11B).

In operation, resin emanating from the central liquid nozzle (330) forms a fan-like file [of resin] directly in front of the liquid nozzle (330). (see col. 21, lines 4-19). The air nozzles (342a, 342b), which are positioned around the central liquid nozzle (330), emit a flow of compressed air onto the fan-like resin film at some distance in front of the central nozzle (330). As a result, explains Kukesh, the compressed air impinges on the resin film, thereby controlling expansion of the resin film and preventing accumulation of resin particles on the central liquid nozzle (330). (see col. 21, lines 8-19).

Unlike Claim 1, Kukesh fails to disclose multiple orifices, each for dispensing wash liquid, and each angled towards a central axis. Instead, Kukesh discloses a single nozzle for dispensing liquid (i.e., central liquid nozzle (330) dispensing resin) surrounded by a plurality of air nozzles (342a, 342b). Further, unlike any orifice of Claim 1, Kukesh requires that its central liquid nozzle (330) be located "...at the longitudinal central line of the nozzle assembly 340." (col. 21, lines 7-8, Fig. 11A, 11B). Kukesh also requires that compressed air be impinged onto the fan-like resin film that emanates from the central liquid nozzle (330) in order to control the

expansion of the resin film, and to prevent resin particles from accumulating on the central nozzle (330). Claim 1, to the contrary, controls spray coverage by controlling the spray angles of the spray streams created by the orifice openings.

Therefore, since Kukesh fails to disclose each and every feature of Claim 1, the Applicants respectfully submit that Claim 1, and all claims that depend thereon, are fully patentable over Kukesh. Further, since Claim 15 recites features similar to those recited in Claim 1, the Applicants respectfully submit that Claim 15, and all claims that depend thereon, is also fully patentable over Kukesh for at least those reasons discussed above.

Turning now to Hughes, a pressure wave mixing apparatus is described. According to Hughes, a supersonic nozzle is used to produce coherent shock waves, which are combined with pressure pulses from an orifice to enhance a propagating range of air or fluid exiting the orifice. (see Abstract). Wave generating cells (100, 101, 102) are mounted around a hole (97) and are angled to intersect at an intersection point (106) at some distance in front of the hole (97). (see col. 10, lines 3-8; and Figs. 7A-7C). Notably, the hole (97) is centered at the central axis (99) of the apparatus. (Id.) The distance from each wave generating cell (100, 101, 102) to the intersection point (106), the distance from the center of the hole (97) to the intersection point (106), and the diameter of the hole (97) are all related to the wavelength of the shock waves produced by the cells (100, 101, 102). (col. 10, lines 13-21). This relationship is what enables the shock waves to enhance the propagation of any air or fluid emanating from the central hole (97), as further explained below.

In operation, when a pressure drop is established, air or other fluid passes through the hole (97) and mixes with shock waves produced by cells (100, 101, 102). (col. 10, lines 24-27). As a result, explains Hughes, the source pressure increases and the intensity of the shock waves

from the cells (100, 101, 102) also increases, thereby energizing the air flowing through the hole (97). (col. 10, lines 44-49). In other words, the mixing of sonic waves with air as it passes through an opening (97) results in the air flow becoming energized, thereby increasing its intensity, energy, and propagation range.

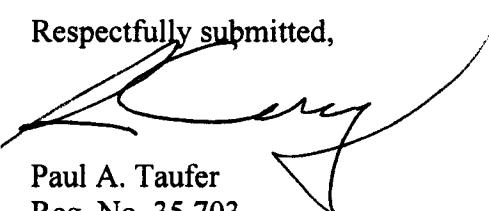
Unlike Claim 1, Hughes fails to disclose multiple orifices, each for dispensing wash liquid, and each angled toward a central axis. Instead, Hughes discloses a single opening (97) through which air or other fluids may pass. The single hole (97) in Hughes is surrounded by a plurality of wave generating cells (100, 101, 102), each for dispensing shock waves. Further, unlike any orifice of Claim 1, Hughes requires that its hole (97) be located about a central axis (99). Hughes also requires mixing sonic waves with air or fluid emanating through the hole (97) in order to energize the air or fluid flow. Claim 1, to the contrary, increases the impinging force of wash liquid utilizing multiple liquid streams emanating from multiple orifices. Hughes, on the other hand, looks to enhance the propagation of an air stream utilizing sonic waves. Indeed, the Hughes apparatus is based on the principles of sonic wave-mixing, which recognizes that when sonic waves are in sync (i.e., the same wavelength), they function to multiply, rather than to cancel each other.

Therefore, since Hughes fails to disclose each and every feature of Claim 1, the Applicants respectfully submit that Claim 1, and all claims that depend thereon, are fully patentable over Hughes. Further, since Claim 15 recites features similar to those recited in Claim 1, the Applicants respectfully submit that Claim 15, and all claims that depend thereon, are also fully patentable over Hughes for at least those reasons discussed above.

Conclusion

In view of the forgoing, the Applicants respectfully submit that Claims 1-7 and 15-20 are now in condition for allowance, which action is respectfully requested. If the Examiner has any questions, or believes that a discussion would be helpful in advancing this case, the Examiner is invited to call the undersigned at the Examiner's convenience.

Respectfully submitted,



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